NAVAL POSTGRADUATE SCHOOL
Monterey, California

EC 3210 MIDTERM EXAM I 11/88Po

- This exam is open book and notes.
- There are three problems; each is equally weighted.
- Partial credit will be given; be sure to do some work on each problem.
- Be sure to include units in your answers.
- Please circle or underline your answers.
- Show *ALL* work.

1	
2	
3	
Total	

Name: _____

1. The free spectral range of a Fabry–Perot interferometer is 10 GHz. If the mirror spacing is increased to 150% times its original value, what is the new value of the free spectral range?

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2. A 5 watt laser operating at 500 nm has a radiant intensity of 5 megawatts per steradian. If this laser beam is passed through a 10:1 beam expander, calculate the irradiance at a distance of 1 km from the beam expander. (You can assume that the 1 km distance is well into the far–field of the laser/expander combination without proving it.)

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3. A half–waveplate (made of an uknown material) is designed for use at 500 nm. It is known that this waveplate has a minimum thickness. The fast axis of the waveplate is oriented vertically; the slow axis is oriented horizontally as shown below on the left.

   The waveplate is mistakenly used with 800 nm light. The input wave is linearly polarized at 35° from the vertical as shown below on the right. What will be the phase difference $\phi_x - \phi_y$ at the output face of the waveplate?